CLAIMS

The embodiments of an invention in which an exclusive property or right is claimed are defined as follows:

1. A system, comprising:

a physical neural network comprising a liquid state machine, wherein said physical neural network comprises molecular connections located within a dielectric solvent between pre-synaptic and post-synaptic electrodes thereof, such that said molecular connections are strengthened or weakened according to an application of an electric field, a frequency or a combination thereof to provide physical neural network connections thereof.

2. The system of claim 1 wherein said liquid state machine comprises a dynamic fading memory mechanism.

3. The system of claim 1 further comprising a supervised learning mechanism associated with said liquid state machine, whereby connections strengths of said molecular connections are determined by pre-synaptic and post-synaptic activity respectively associated with said pre-synaptic and post-synaptic electrodes.

4. The system of claim 3 wherein said supervised learning mechanism comprises at least one perceptron.

5. The system of claim 3 wherein said supervised learning mechanism learns via feedback obtained from said post-synaptic electrodes.

6. The system of claim 3 wherein said supervised learning mechanism comprises a linear read out mechanism.

7. The system of claim 3 wherein said supervised learning mechanism evolves based on an activity depending learning rule.

8. The system of claim 3 wherein said supervised learning mechanism evolves based on pre-synaptic and post-synaptic activity, including a voltage, frequency, or a combination thereof.

9. The system of claim 1 wherein said molecular connections comprise nanoparticles.

10. The system of claim 1 wherein said molecular connections comprise molecules.

11. The system of claim 1 further comprising a connection network also comprising a plurality of said molecular connections, wherein molecular nanoconnection thereof can be strengthened or weakened according to an application of said electric field or said frequency.

12. A system, comprising:

a physical neural network comprising a liquid state machine, wherein said physical neural network comprises molecular connections located within a dielectric solvent between pre-synaptic and post-synaptic electrodes thereof, such that said molecular connections are strengthened or weakened according to an application of an electric field, a frequency or a combination thereof to provide physical neural network connections thereof; and

a supervised learning mechanism associated with said liquid state machine, whereby connections strengths of said molecular connections are determined by pre-synaptic and post-synaptic activity respectively associated with said pre-synaptic and post-synaptic electrodes, wherein said liquid state machine comprises a dynamic fading memory mechanism.

13. The system of claim 12 wherein said supervised learning mechanism comprises at least one perceptron.

14. The system of claim 12 wherein said supervised learning mechanism learns via feedback obtained from said pre-synaptic and post-synaptic electrodes.

15. The system of claim 12 wherein said supervised learning mechanism comprises a linear read out mechanism.

16. The system of claim 15 wherein said supervised learning mechanism evolves based on post-synaptic activity, including a voltage, frequency, or a combination thereof.

17. The system of claim 12 wherein said molecular connections comprise nanoconnections.

18. A system, comprising:

a physical neural network comprising a liquid state machine, wherein said physical neural network is formed utilizing nanotechnology, including nanoconnections located within a dielectric solvent between pre-synaptic and post-synaptic electrodes thereof, such that said nanoconnections are strengthened or weakened according to an application of an electric field, a frequency or a combination thereof to provide a physical neural network thereof; and

a supervised learning mechanism associated with said liquid state machine, whereby connections strengths of said nanoconnections are determined by pre-synaptic and post-synaptic activity respectively associated with said pre-synaptic and post-synaptic electrodes, wherein said liquid state machine comprises a dynamic fading memory mechanism.

19. The system of claim 19 wherein said physical neural network further comprises at least one connection network associated with at least one neuron-like node wherein said at least one connection network comprises a plurality of said nanoconnections, including a plurality of interconnected nanoconductors, wherein each nanoconductor of said plurality of interconnected nanoconductors

is strengthened or weakened according to an application of an electric field or frequency thereof.

20. The system of claim 19 wherein:

each nanoconductor of said plurality of interconnected nanoconductors experiences an increase in alignment in accordance with an increase or a decrease in said electric field, said frequency, or said combination thereof;

wherein nanoconductors of said plurality of interconnected nanoconductors that are utilized most frequently by said at least one neuron-like node become stronger with each use thereof;

and wherein nanoconductors of said plurality of interconnected nanoconductors that are utilized least frequently become increasingly weak and eventually become unaligned.